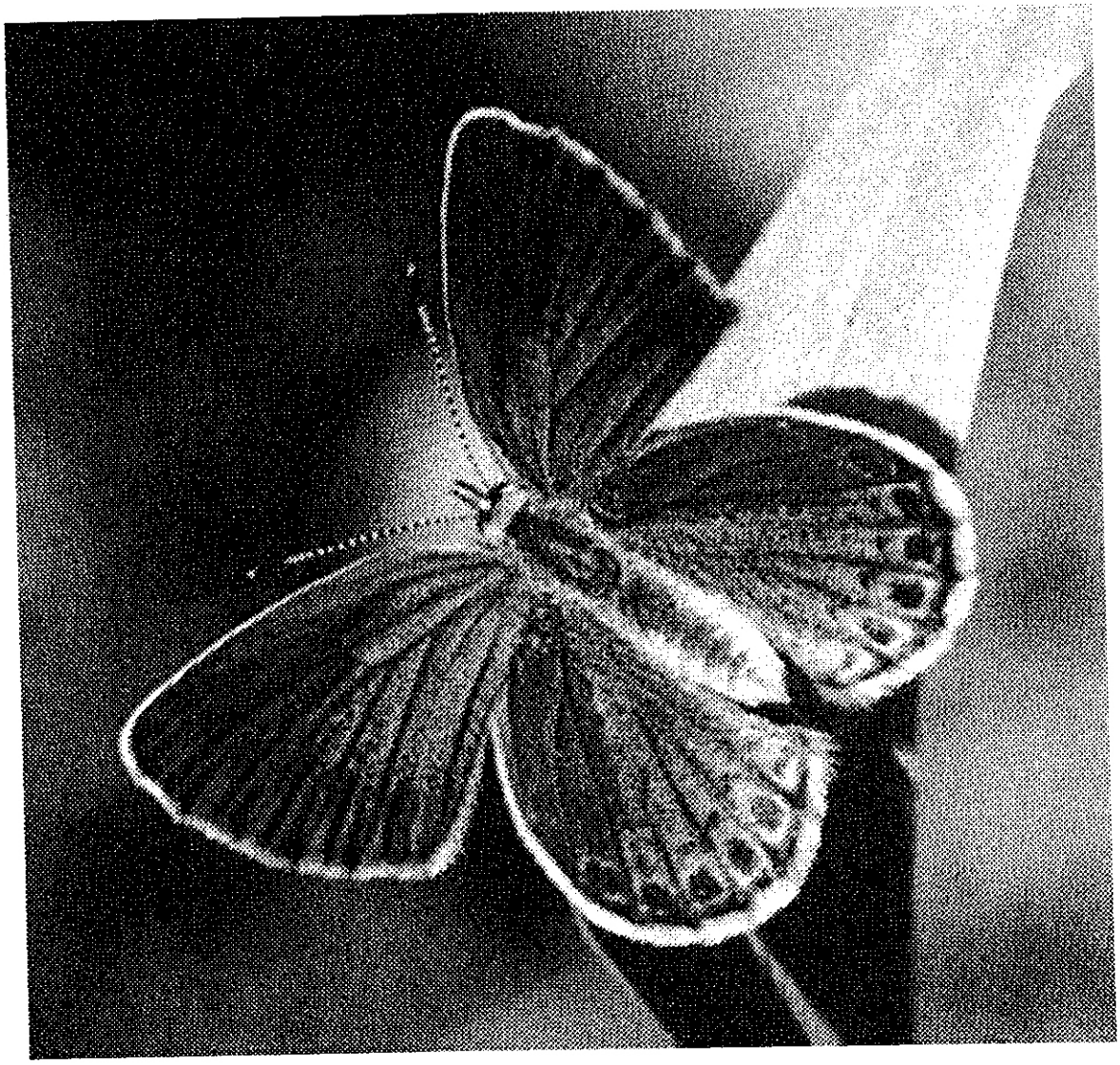
SAVING AN ENDANGERED BUTTERFLY



A Teacher's Guide to Leading a Hike in Miller Woods at Indiana Dunes National Lakeshore

Acknowledgements

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Created and written by John Manka with suggestions from Kathleen Harter, 1998. Front cover photograph by Randy Knudson.

Lupine Flower

Printed on recycled paper.

HOW TO USE THIS GUIDE

All of the activities in this guide are connected to the theme: "Careful studies of the endangered Karner blue butterflies' life cycle have helped park rangers develop a plan for its survival."

After leading a hike to Miller Woods, your students will be able to:

- Explain how one species, the Karner blue butterfly, became an endangered species.
- Explain how a forest fire helps lupine plants grow.
- Discuss the relationships between forest fires, lupine and Karner blue butterflies.
- Write a poem to describe their feelings about an endangered species and/or Indiana Dunes.

Enclosed in this guide are pre and post-visit activities plus information that you can use to lead a hike on the Miller Woods trail by the Paul H. Douglas Center for Environmental Education. Learn about the park's efforts to save the endangered Karner blue butterfly.

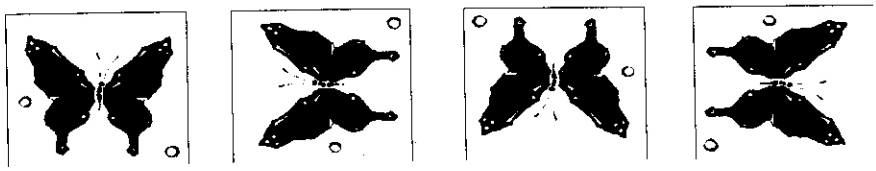
The pre-visit activity, "Burning for Butterflies", will introduce your students to the Karner blue butterfly and its habitat.

There are four activities do be completed during your hike. You can review them before you go and lead the activities yourself. However, consider assigning students to be the leaders of the activities. This method will allow you to facilitate the hike and give the students an opportunity to become teachers. They will get much more out of the experience.

If you decide to have the students be the teachers, they will need a copy of "A Prescription to Save a Butterfly", "Everything is Connected in Nature" "Hard Land, Soft Land", and "Postcards from the Bridge" to study before coming to the park.

The map of Miller Woods suggests the hiking route and wide places in the trail to conduct the four field trip activities. Please remember to bring a kit of water and cans for "Hard Land, Soft Land" and 4X6 cards and pencils for "Postcards from the Bridge."

Review what the students learned by doing the post-visit activities.



Introducing the Karner Blue Butterfly

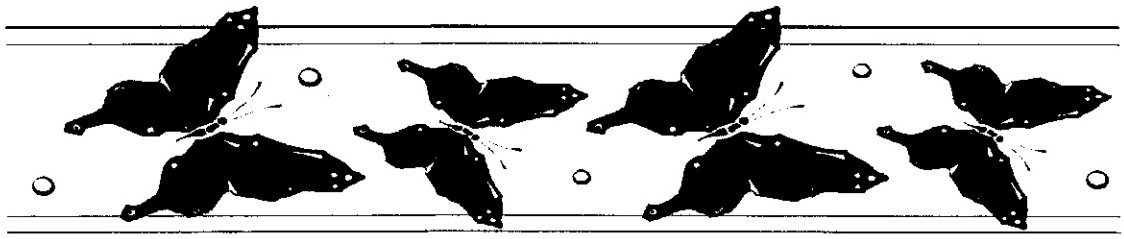
Background information for the teacher. The Karner blue butterfly was officially listed as a Federally Endangered species on December 14, 1992. Dependent on open oak savanna habitats and upon the presence of wild lupine plants as the only food source for the caterpillar, the current population of Karner blue butterflies (Kbb) has diminished to 1% of their historic abundance of 100 years ago. Habitat destruction and fire suppression are the primary factors responsible for Kbb declines.

Two distinct populations have been identified within Indiana Dunes National Lakeshore, representing the largest known population of Kbb in the state of Indiana. The adult butterfly lives only 5 to 14 days and will only disperse a half-mile from the area where they emerge from the cocoon. However, 80% travel less than 300 feet. Because of their limited distance of dispersal, the two populations remain isolated from each other.

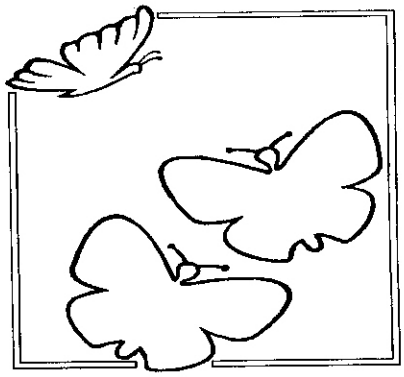
During 1997 and 1998, school students collected lupine seeds to germinate in their classroom and later planted them along the Marquette bike trail to establish a corridor to encourage migration between the two populations. The pre-visit activity, "Burning for Butterflies", will introduce your students to this project.

Lupine are most abundant in areas where frequent forest fires remove the woody plants which otherwise deprive the lupine of sunlight. The park resource management is undertaking a prescribed burn policy that restores open areas in the forest canopy.

The population of Kbb in Miller Woods is increasing as lupine plants benefit from the park's prescribed fire policy. Annually the butterfly population is surveyed and monitored. Your hike through Miller Woods will help your students understand some of the steps the park has taken to help the Kbb.



Burning For Butterflies



A pre-visit activity.

The endangered Karner blue butterfly is helped by the prescribed burns in the park and by students growing plants in their classroom. Read the following section to your students before they do the copycat page.

Carrying insect nets, a group of park researchers hike into Miller Woods to search for the endangered Karner blue butterfly. The butterflies are found living near lupine plants that grow under the oak trees. The lupine plants are the only food for their caterpillars. The adults live for only five to fourteen days and spend this time looking for a mate.

To help prevent their extinction, researchers need more information about the lives of these insects. Sweeping their nets above the lupine they capture these one-inch butterflies and carefully mark numbers on their wings before releasing them. The goal of this research is to recapture the butterflies and see how far they have moved.

Lupine has a beautiful blue spike of flowers and a distinctive palm-shaped leaf. In years past, forest fires burned openings in the woodland dune community where the lupines grew under the trees. Now forest fires are put out quickly after they are discovered. The trees grow so large they prevent sunlight from reaching the lupines below. As the lupines stop growing, the butterfly population has declined toward extinction.

Researchers have found only two areas in the park where a population of butterflies live. They wondered if the butterflies from one population could fly over to mate with members of the other population. You will be able to use their research data to help determine the answer to this question.

Answers to the Copycat Pages that Follow.

1. No, 80% of the captured Karner blue butterflies travel less than 300 feet.
2. The two distinct populations of butterflies in the park are the largest in Indiana.
3. The two populations are isolated from each other.
4. The maximum distance a butterfly traveled was 2500 feet. If one population dies out, the other population is not close enough for butterflies to naturally repopulate.
5. Three
6. Yes. Butterflies have been captured showing they move from one plot to another.
7. Yes. Creating new habitat helps the Karner blue butterfly, but the park will always be concerned about their survival. The park will need to continue with prescribed burns and monitoring the butterfly's population. Please emphasize that students helped collect seeds, grow seedlings and replant. Students should know they could make a difference.

Copycat Page - Burning for Butterflies

Make a map showing the locations where researchers captured butterflies by placing the number in the boxes. Some boxes might have more than one number.

Butterfly number 9 – M10, N10, M12, M11
Butterfly number 10 – B3, A2, C5
Butterfly number 12 – K7, K8, K10, J6
Butterfly number 13 – K7, L8, L9
Butterfly number 16 – C5, C6, D6, B6
Butterfly number 17 – B4, C3, D3, D4

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
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14														

Be a scientist and see if you can answer these questions. Use the information you put on the map.

1. The shaded boxes indicate where the lupine grows. Do Karner blue butterflies travel very far away from the lupine?

2. Does the lupine look like it grows throughout the whole map or in two patches?

3. Did you find any butterflies that flew from one patch of lupine to the other?

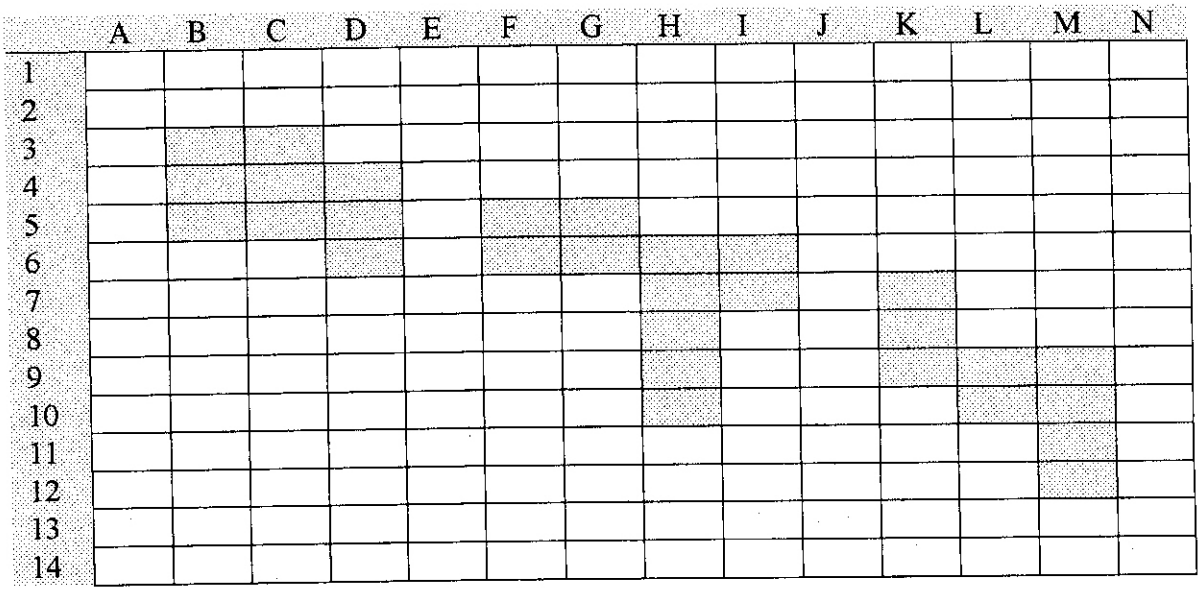
4. Suppose all of the butterflies in one patch died and the butterflies in the other patch survived. Would the surviving butterflies fly far enough to repopulate the other patch?

Lupine flower

Park rangers and researchers devised a plan to help the butterflies. First they had a prescribed burn. This is a controlled forest fire where rangers do not allow the fire to burn too hot. The fire did kill some bushes and small trees so more sunlight reached the forest floor.

Then fourth and fifth grade students came out and collected seeds. During the winter they grew lupine, grasses, and wildflowers seedlings to plant in the spring. With the fire and the help of the students, a prairie community was regenerated. Place the numbers of the captured butterflies on the map.

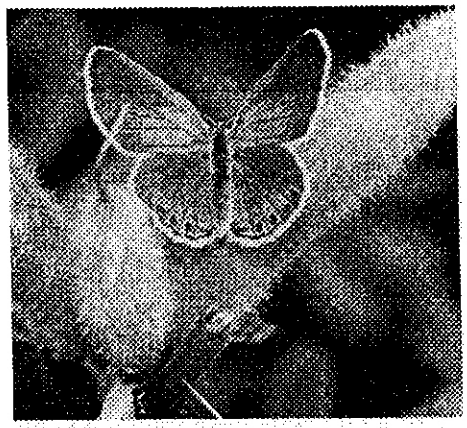
Butterfly number 23 – C4, D4. B4
Butterfly number 25 – D5, D4, E4, F5
Butterfly number 26 – F6, G5, H7, H6
Butterfly number 30 – I6, I5, H6, J6
Butterfly number 33 – K9, K7, J7, I6
Butterfly number 35 – K10, M11, M12



5. How many patches of lupine are on the map?

6. Can you tell if the patches of lupine are close enough for butterflies to move from one patch of lupine to another?

7. What if all the butterflies in one patch died, could butterflies from the other patches migrate in to repopulate the patch?



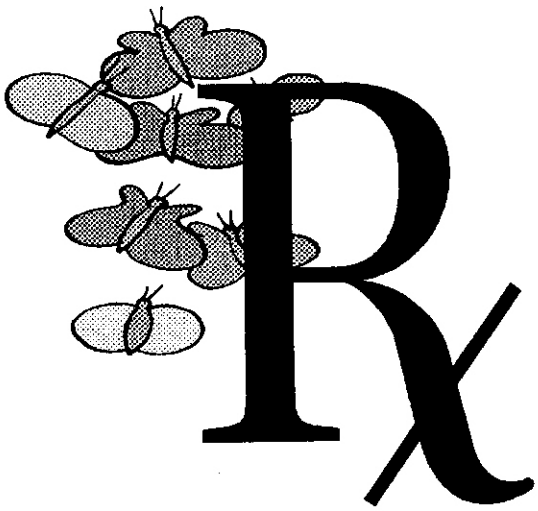
FEMALE KARNER BLUE BUTTERFLY

What is a forest fire like?

A classroom activity

Forest fires are an important part of the natural environment. We all have pictures in our mind about what we think a forest fire is like. Have the students describe a fire by writing a list of adjectives.

Hold a discussion about what the students think happens to the forest and animals during a fire. Let them hold on to these concepts so they can compare them to the "Prescription to Save a Butterfly" activity you will do on the field trip.



A Prescription to Save a Butterfly

A field trip activity

Read the following information about the importance of forest fires to the Kbb survival. To increase the attention of the students, let them know they will be actors presenting a play about a forest fire. They might think what role they would like to act out as this story is read.

A large group of firefighters dressed in yellow and green protective uniforms arrive at Miller Woods with fire engines and a tanker truck. The day before they used rakes and shovels to clear a fire line. If the fire line was properly cleared, a forest fire would burn up to it and stop.

The firefighters have a prescription to start a fire and keep it under control. If the wind speed, temperature, relative humidity and moisture indicate the fire will not get out of hand, they will start the burn.

When the approval is given, the firefighters start the leaves on fire. Flames one to four feet high begin traveling along the forest floor. With little wind, the firefighters have time to stand and watch the flames move through the fallen leaves and branches. Even with a wind, the flames move slower than a firefighter can walk.

The deer are scared away by all the activity. Many insects actively try to escape the flames by jumping or flying in front of the flames. Some birds fly through the smoke to capture and eat the fleeing insects. A mouse scurries away from the flames. An owl, awakened by all the activity, swoops down and captures it.

Two raccoons move out on a limb as the interior of their hollow tree starts to burn. After the fire has burned all the leaves under the limb, the raccoons abandon their burning tree by jumping to the ground. The firefighters learn that raccoons have a second den when they watch the raccoons crawl into another tree.

Snakes, mice, chipmunks, salamanders and other animals stay hidden in the ground as the flames burn above them. They will be unharmed.

The park schedules prescribed burns for the early spring or late fall when most of the plants will not be damaged. Early spring plants will be burned by the flames but they are quickly replaced by new shoots a couple of weeks later. Small trees with thin bark begin to burn and die as the flames become hotter, but the older trees with thicker bark can withstand the heat unaffected.

After the flames burn out, hollow trees, logs and fallen branches still burn. The firefighters mop up the fire by using axes and water to put them out.

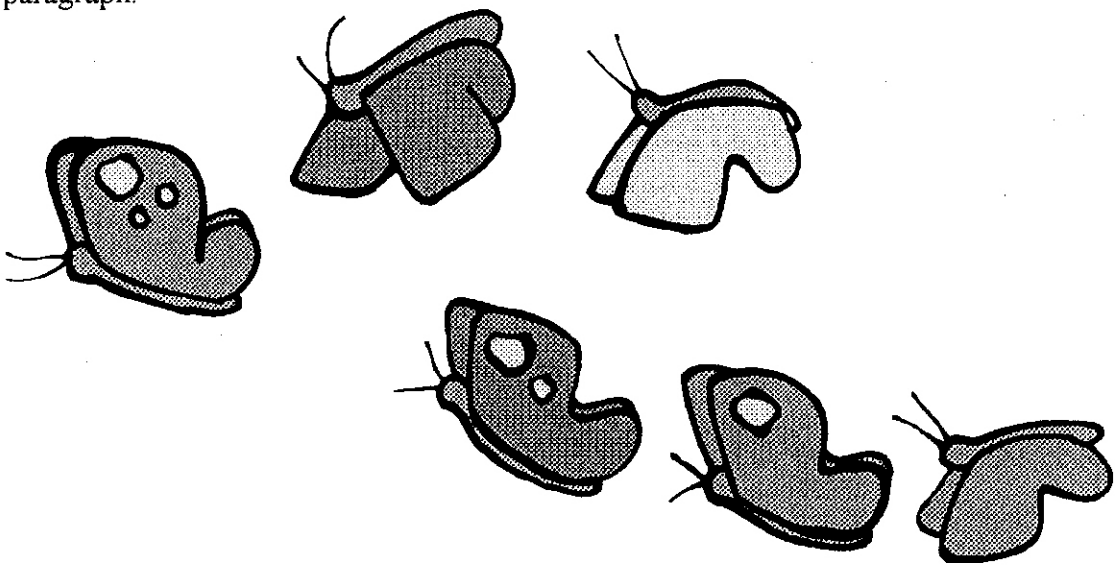
Just days after the fire, the first green leaves of plants stand out against the black ash. Lupine plants grow faster with the extra nutrients released into the soil by the flames. The small trees, dead from the ground up, will not shade the lupine this year. It will be a good year for butterflies to flutter above the plants during the summer.

The firefighters have helped this endangered species, but their job is not complete. The fire did not kill the roots of the small trees, and they will send up new shoots. In a few years they will be tall enough to shade the lupines, and Miller Woods will need to be burned again.

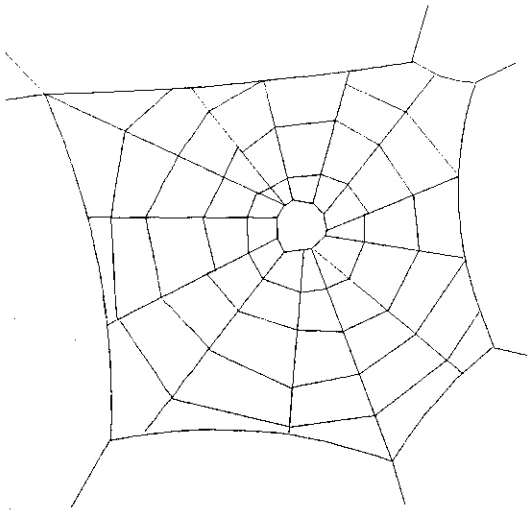
Creating a play about a forest fire. Using the information from the story they just heard, let the students use their imagination to organize and present a play. If you divide the class into two groups, they can present their theatrical performance to an audience.

This is the message the rangers want you to remember. "Lupine needs sunlight to grow so the park uses prescribed burns to kill the small woody plants that create the shade. As the lupine responds to the increased sunlight, there is more food for the Karner blue butterflies so their population increases."

You can tell the students this information, but it would be best if you ask them to make a summary of the message and see if they hit the main points outlined in the above paragraph.



What to look for while you hike. Before the group starts to walk again, ask the students to look for signs of recent forest fires and small flags that designate the area where researchers are studying the effects of the fires.



Everything is Connected in Nature

A field trip activity

When the park researchers started to study the Karner blue butterfly, they found their plan to save this endangered species required many steps. Since the caterpillars of the Karner blue butterfly will only eat lupine plants, researchers had to design studies to determine the growing requirements of that plant.

Lupines grow in the sunny areas of an open forest called an oak savanna. Forest fires frequently burned through the oak savanna. Fire prevented small oak trees from growing so there was sunny habitat, which was ideal for lupine to grow. A hundred years ago the Karner blue butterfly was common in the Indiana Dunes area.

As more people moved into this area, they used the oak savanna to build their factories and homes. As lupine's habitat decreased and so did the Karner blue population. Then people began putting out forest fires as quickly as they started. Without forest fires, the trees grew and shaded the remaining lupine plants. With the lupine disappearing, the Karner blue population reached a level so small that it was placed on the Endangered Species list.

Playing Karner blue butterfly mix-up

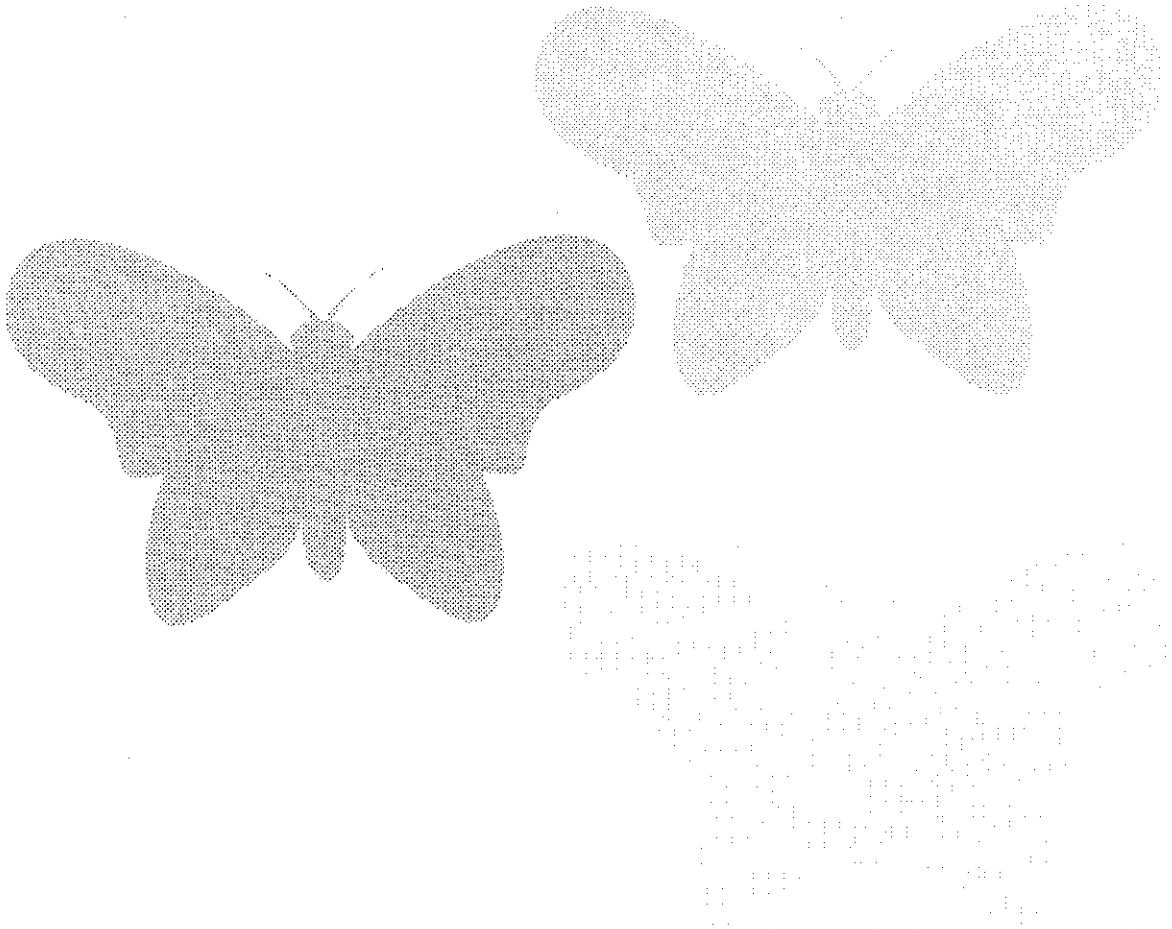
1. Cut out 41 even sized cardboard cards. Label eight of the cardboard cards with the word "fire". Then label three sets of eight cards with "lupine", "sunny spots", and "found a mate". Leave nine cards blank.

2. Use the concept of a baseball diamond and designate four bases. Have the students randomly choose a base to stand near. (There needs to be at six to nine students on a team. If the class is small only make three bases.)

3. Place one card for each student in the center. There should be an equal number of each of the four types of cards. It's all right to have a few extra cards in the center. Instruct the students to pick up a card and go back to their base without showing their card.

4. Ask any student with a "fire" card to reveal it. Without frequent fires there will not be any sunny spots.

5. Then ask students to reveal their "sunny spots" cards, followed by the "lupine" and "found a mate". A team is successful only if the have all four cards in their group.



6. After one or two rounds of the game, explain how people thought they were protecting the forest by putting all fires out. To show the impact, remove three "fires" cards and replace them with blank ones. Play the game again.

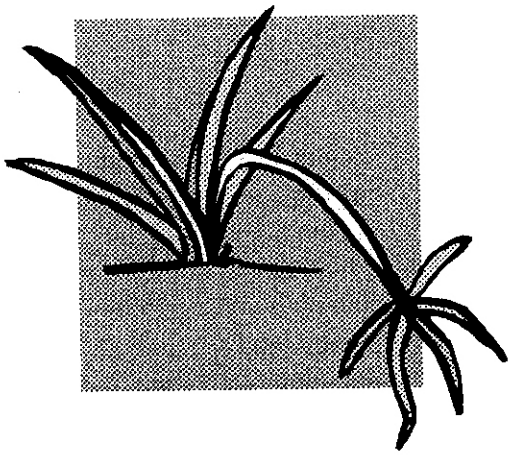
7. After the forest fires were contained, the forest grew and leaves shaded the sunny spots. Now remove three of the "sunny spots" cards and replace them with blank ones. Play another round.

8. Without as many sunny spots, there were less lupine plants so remove three "lupine" cards and replace them with blank ones. Play again.

Conclusion to this activity

Ask the students to summarize what they learned from this activity. Together they should be able to cover these important concepts:

- Lupine plants need fire to open sunny spots so they have the right habitat.
- People mistakenly believe that forest fires are always bad, but in nature many plants and animals need frequent fires.
- The Karner blue butterfly became endangered because its habitat was lost and forest fires were suppressed.



Hard Land, Soft Land

A field trip activity

Bring these materials to Miller Woods: Metal cans, all the same size, with both ends cut off. Measuring cups of the same size. (Yogurt cups work well) A two liter bottle of water.

Discover the answer to this question. To start, tell your fellow students that they are going to do an experiment to help answer the question, "Does walking off the trail have an impact on the plants?"

Set up the experiment carefully so you get the proper results. You must pick a section of trail that has hard, compacted soil. If you pick an area with loose sand, you will get incorrect results.

Activity: These are the instructions for two groups. (It would be great to have six or eight groups doing the test at the same time.)

Give each group a can with both ends cut off and a cup. Find an area in a hard section of the trail to test and another in the woods three feet from the trail. Push the can down at least one-inch into the soil. When testing the forest, remove any leaves before pushing the can in so the leaves do not block the bottom of the can.

Now it's time to have a race to see which area absorbs water faster. Fill each yogurt cup with water. When you say go, each team should pour the water from their cup into their can. The water must go down into the soil and not leak out around the edge of the can. (Note: if it rained recently this test can take a longer time because of the wet ground.)

Questions to ask after doing the activity. Ask your fellow students these questions.

- (1) What do you think happens to lupine that tries to grow on the trail?
- (2) Compare the trail and the ground next to it. Is the trail higher than the surrounding ground or lower? Can you explain why?
- (3) Why do trails get muddier after a rain than the surrounding ground?
- (4) What animals loosen the forest soil so water has an easier time going down?
- (5) Why does staying on the trail help save the Karner blue butterfly?

Your teacher has the answers to all these questions but first write down your best answer to give to the teacher.

Here is your big ending. This is the message the rangers want you to remember. Everyone can do small things to help save the Karner blue butterfly like staying on the trail to protect the soil and plants.

Postcards from the Bridge

A field trip activity

The objective of this activity is to allow the student to describe how she/he feels about endangered species, Karner blue butterflies or Indiana Dunes. The bridge across the pond can be one of many good places to conduct this activity.

Procedure: Give the students a blank 4 by 6 index card. On one side they can draw a picture of something they saw or learned. On the other they can write how they feel about the park, endangered species or the Karner blue butterfly. Ask them to be more descriptive than just "cool" or "awesome".

Students should spread out and work alone without talking. Talking can take the students away from observing and having feelings for the park.

Another option is to write along the edge of a note card the words, "Indiana Dunes", "Karner blue butterfly" or "Endangered Species". Using those letters the students should compose an acrostic poem which includes things they have seen, heard, felt or learned.

E verthing in the world
N eeds a place to live. The
D unes contains plants
A nd animals that are
N earing
G lobal
E xtinction. I
R ealize I must help make the
E ffort to remove them from this
D anger. By

S eeing the
P ark and
E njoying this field trip, I have
Concluded that saving animals is
I mportant to the
E arth and I will
S hare that with others.

The Top Five Reasons to Help Protect the Karner Blue Butterfly

A post-visit activity

This brainstorming technique encourages students' creativity and requires cooperation as they evaluate ideas to include in a top five list.

Using a Brainstorming Technique. Ask the students to suggest reasons why they think the Karner blue butterfly should be protected. As they suggest ideas, place each one on the blackboard. Accept every suggestion even if you think it is wrong.

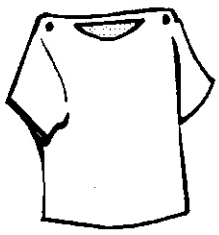
Then vote to choose the best ideas. They will be compiling a list of the five most popular ideas. Each student gets to vote twice for his or her two top choices. Add up all the votes. The scores will rank the ideas.

Follow up: Make a bulletin board with the results. Use this technique to help make other choices in the classroom.

What Would I Do?

Five post-visit activities

1. The Karner blue butterfly seems like an unimportant part of nature. Suppose they disappeared. Would it matter? Park rangers spend a lot of time trying to save this species. Divide the students into two groups. Have one group brainstorm for reasons why people should make an effort to save the Karner blue butterfly. The other group can suggest reasons why the effort and money should not be spent on an insect.



2. In a sharing circle, ask the students to complete, "If I could do one thing to help an endangered species, I would....."

3. Pretend you joined an organization to make money to help preserve the Karner blue butterfly. Have, the students design a T-shirt that could be sold to raise money and increase people's awareness to this endangered species.

4. Have the students draw a picture that shows their impressions from the field trip. To set the mood, play a tape that combines nature sounds with music. In a sharing circle, allow the students to explain their picture and impressions.

5. Write a letter that describes the Karner blue butterfly and its survival problems and send it to a student two years younger. Inform the young student about the efforts being used to help save this endangered species.

Teaching Tips and Answers for the Activities

Burning for Butterflies, a pre-visit activity

Use this peppy cheer to help students remember what a habitat is. "Food, water, shelter and space, habitat is a wonderful place." The Karner blue butterfly has become endangered because its habitat has disappeared. This is an optimistic activity that shows how students helped create more Kbb habitat.

After completing the copycat page, have the students color the lupine flowers blue so they become more aware of the plant. It blooms during May and June.

A Prescription to Save a Butterfly, a field trip activity

Please find a wide spot in the trail and ask the students to use care not to step on the plants. You should assign students with good reading skills.

There are numerous parts the students can act out but here are some suggestions:

Firefighters	Birds	Lupine
Flames	Small trees	Karner blue butterflies
Insects	Large trees	

Everything is Connected in Nature, a field trip activity

Students really like to succeed in this game. They are disappointed when their team does not have all four elements. The game is trying to have the students feel that disappointment. It illustrates how everything is connected. When one of the elements is missing, the Karner blue butterfly suffers.

Once the sunny spots, lupine, and Kbb disappeared because the fires were suppressed, the Kbb suffers the most. As a fire renews the sunny spots, lupine seeds remaining in the soil for years, germinate. The Kbb with their limited dispersal distance may not be able to repopulate within this lupine patch. This is why the Kbb is endangered and the lupine is not.

Hard Land, Soft Land, a field trip activity

Bring a kit of cans, yogurt containers and water bottles, as listed on the top of the activity sheet. A kit might be available at the Paul H. Douglas Center for Environmental Education. Reserve it by calling 219-938-8221.

The test results should show the water goes down into the forest faster than the trail.

Answer Key for "Hard Land, Soft Land."

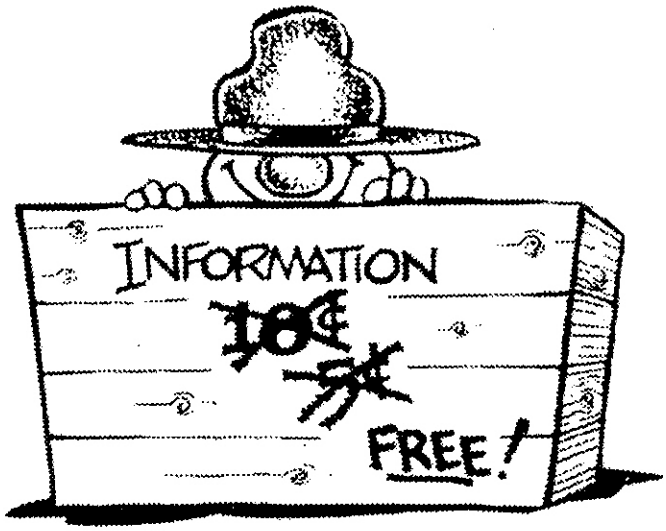
1. Usually they cannot germinate in the compacted soil. If they do, they may find the soil too hard to grow in or they are stepped on.
2. The trail is lower because the soil is compacted.
3. Compacted soil has few air spaces to allow the water to percolate.
4. Earthworms, moles, ants, any animal that digs a den or nest are some.
5. By staying on the trail you do not compact the soil or step on lupine plants.

Postcards from the Bridge, a field trip activity

Bring pencils, blank 4X6 notecards and a back up piece of cardboard for each student. Separate the students so they are not distracted.

Need More Help?

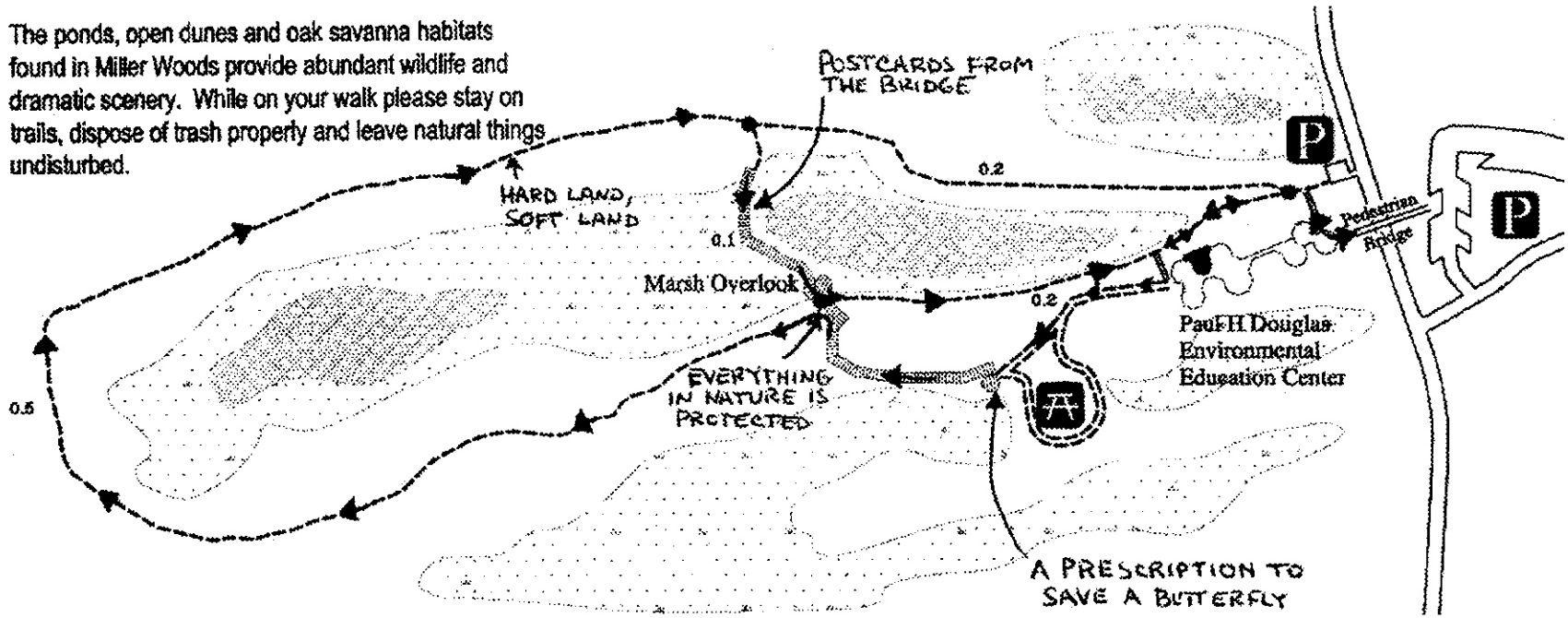
If you need more information to plan your field trip, contact the National Lakeshore at (219) 926-7561 Ext 243 or 245. Thank you for visiting the park.



To learn more about Indiana Dunes National Lakeshore visit our website at www.nps.gov/indu. For a copy of this or other educational materials visit www.nps.gov/indu/education/index.htm

Miller Woods Trail

The recommended route and suggested areas to conduct activities are indicated.



The following four field trip activities will help students understand the theme of this guide: "Careful studies of the endangered Karner blue butterflies' life cycle have helped park rangers develop a plan for its survival".

The plan includes:

Protection

research

prescribe burns

monitoring

education

Draw a Kbb and lupine plant

Photographs
Drawing of a Kbb
Oak savanna

Map of Miller Woods trail.